



SPG4000W USER MANUAL

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ABOUT THIS MANUAL

Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

SAFETY INSTRUCTIONS



WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** --Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required specification to select appropriate cable Size. It's very important to correctly operate this inverter charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. Fuses 58VDC for 5KVA are provided as over-current protection for the battery supply.
11. **GROUNDING INSTRUCTIONS** -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. **NEVER** cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

INTRODUCTION

This is a multi-function inverter/charger, combining functions of inverter, MPPT solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Features

- Pure sine wave inverter
- Built-in MPPT solar charge controller
- Configurable input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Compatible to mains voltage or generator power
- Auto restart while AC is recovering
- Overload/ Over temperature/ short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

Basic System Architecture

The following illustration shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

- Generator or Utility.
- PV modules

This inverter can power all kinds of appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator, water pump and air conditioner.

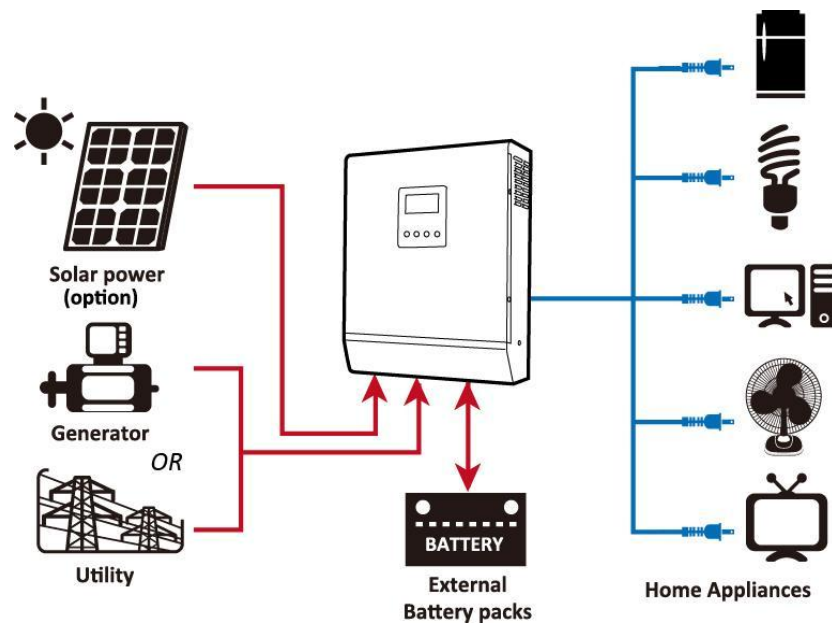
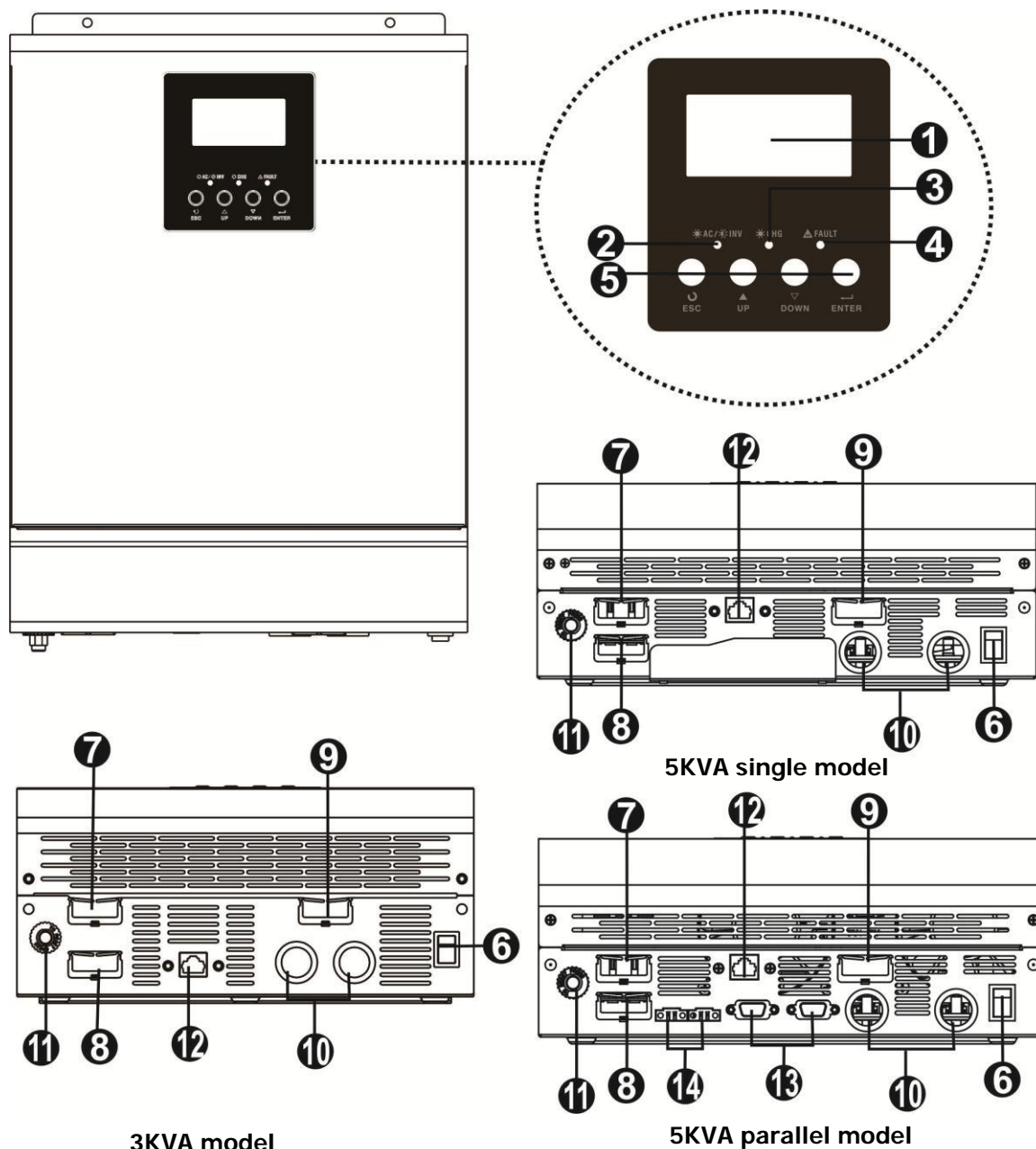


Figure 1 Hybrid Power System

Product Overview



NOTE: For parallel model installation and operation, please check separate parallel installation guide for the details.

1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. Circuit breaker
12. RS232 communication port
13. Parallel communication cable (only for parallel model)
14. Current sharing cable (only for parallel model)

INSTALLATION

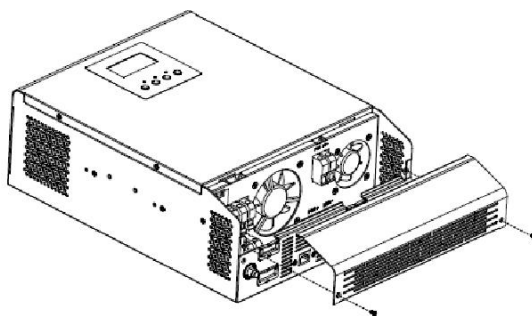
Unpacking and Inspection

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:

- The unit x 1
- User manual x 1
- Communication cable x 1
- Software CD x 1

Preparation

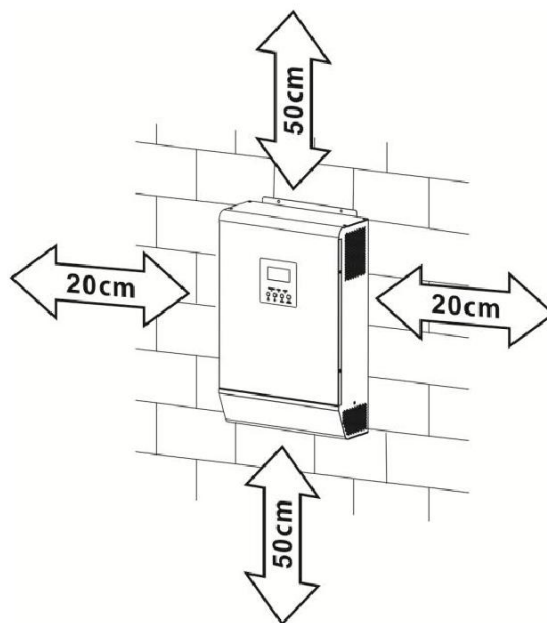
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

Consider the following points before selecting where to install:

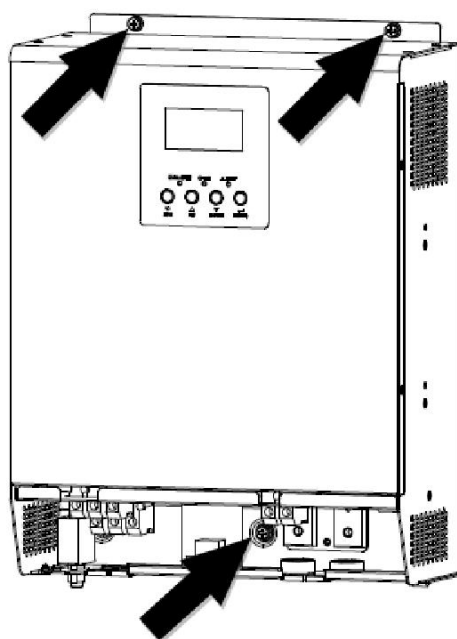
- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



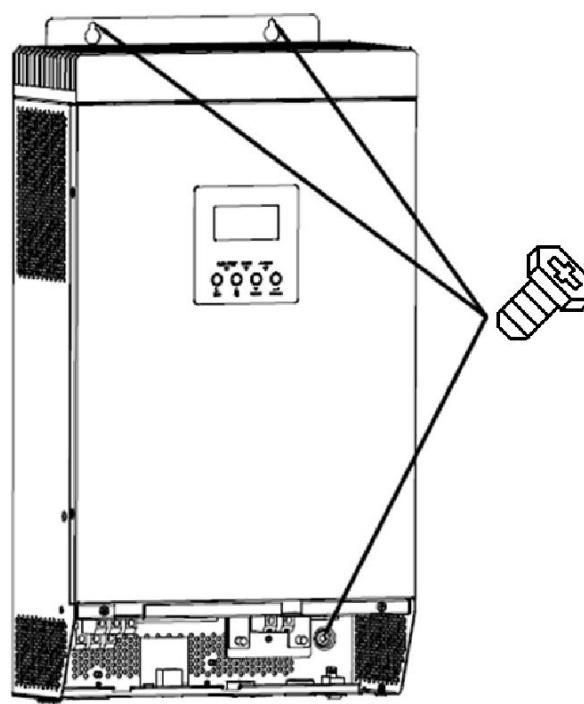
SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.

Install the unit by screwing three screws.

3KVA 48V model



5KVA 48V model



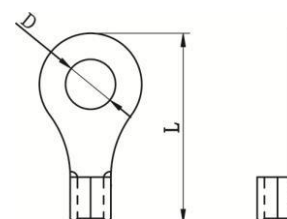
Battery Connection

CAUTION: For safety operation and regulation compliance, -current it's protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested-current protection installed to have. Please refer over to typical amperage in below table as required fuse or breaker size.

WARNING! All wiring must be performed by a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

Ring terminal:



Recommended battery cable and terminal size:

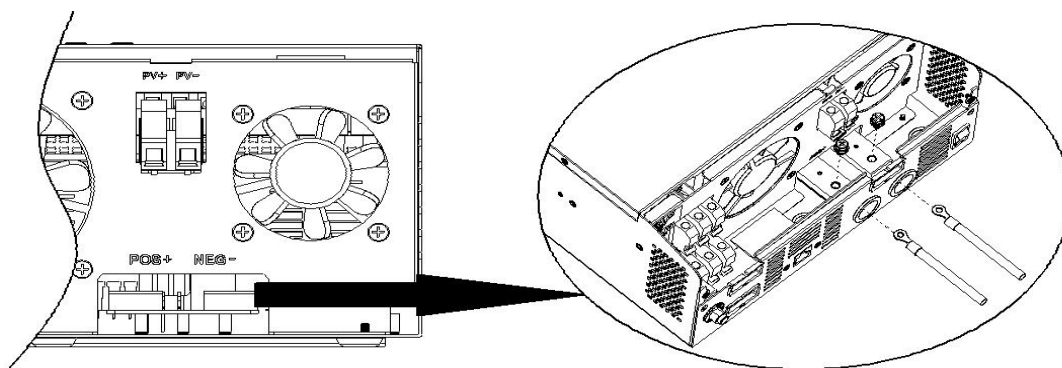
| Model | Typical Amperage | Battery Capacity | Wire Size | Ring Terminal | | | Torque Value |
|-------|------------------|------------------|-----------|-----------------------|------------|--------|--------------|
| | | | | Cable mm ² | Dimensions | | |
| | | | | | D (mm) | L (mm) | |
| 3KVA | 50A | 100AH | 1*8AWG | 8 | 6.4 | 23.8 | 2~ 3 Nm |
| | | | | | | | |
| 5KVA | 87A | 200AH | 1*4AWG | 22 | 6.4 | 33.2 | 2~ 3 Nm |
| | | | 2*8AWG | 14 | 6.4 | 29.2 | |

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Connect all battery packs as units requires. It's suggested to connect battery for at least 1-3KVA model and at least 200Ah capacity battery for 4KVA/5KVA model.

NOTE: Please only use sealed lead acid battery or sealed GEL/AGM lead-acid battery.

3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



WARNING: Shock Hazard

Installation must be performed with care due to high battery voltage in series.



CAUTION!! Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur.

CAUTION!! Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.

CAUTION!! Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

AC Input / Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 10A for 1KVA, 20A for 2KVA, 32A for 3KVA, 40A for 4KVA and 50A for 5KVA.

CAUTION!! There are two terminal blocks with "IN"-connect and input "OUT and output connectors.

WARNING! All wiring must be performed by a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires

| Model | Gauge | Torque Value |
|-------|--------|--------------|
| 3KVA | 12 AWG | 1.2~ 1.6 Nm |
| 5KVA | 8 AWG | 1.4~ 1.6Nm |

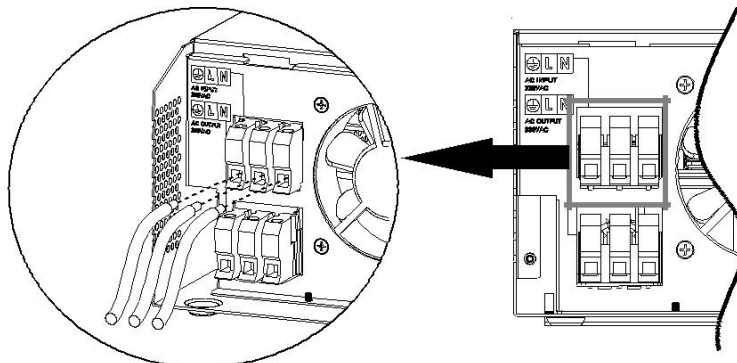
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnect or first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.

⊕→**Ground (yellow-green)**

L→LINE (brown or black)

N→Neutral (blue)

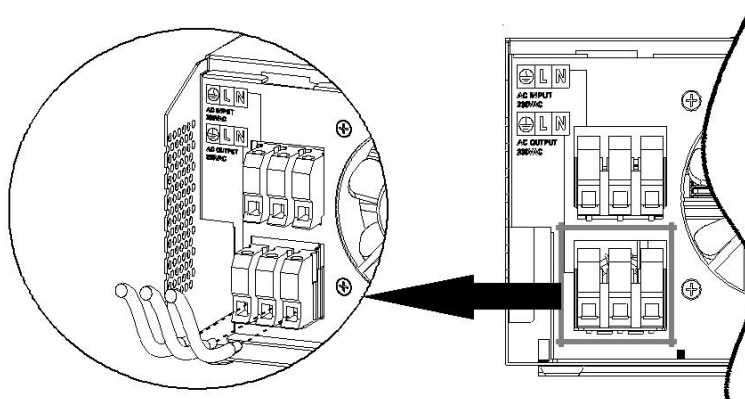


WARNING:

Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⊕) first.

⊕→**Ground (yellow-green)** **L→LINE (brown or black)** **N→Neutral (blue)**



5. Make sure the wires are securely connected.

CAUTION: Important

Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

CAUTION: Appliances such as air conditioner are required at least 2~3 minutes to restart because it to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner-delayfunctionifbeforeit'sinstallationequipped.Otherwise,this inverter/charger will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV Connection

CAUTION: Before connecting to PV modules, please install **separately** a DC circuit breaker between inverter and PV modules.

WARNING! All wiring must be performed by a qualified personnel.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

| Model | Typical Amperage | Cable Size | Torque |
|-------|------------------|------------|------------|
| 3KVA | 18A | 14 AWG | 1.2~1.6 Nm |
| 5KVA | 60A | 8 AWG | 1.4~1.6 Nm |

PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

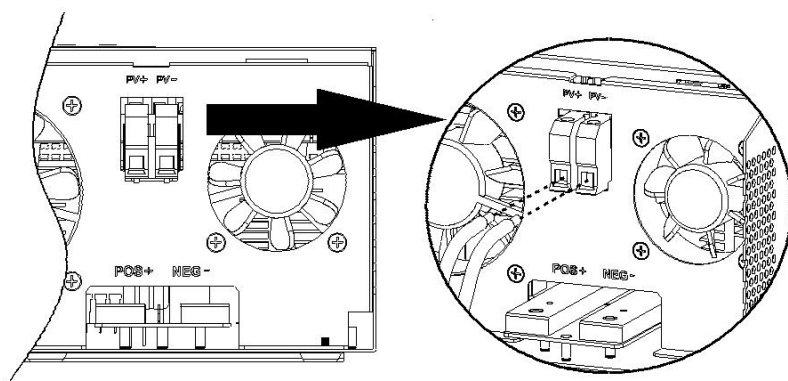
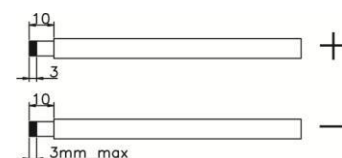
1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

Solar Charging Mode

| INVERTER MODEL | 3KVA | 5KVA |
|------------------------------------|------------|-----------|
| Max. PV Array Open Circuit Voltage | 102Vdc max | 145Vdc |
| PV Array MPPT Voltage Range | 60~88Vdc | 60~115Vdc |
| Min. battery voltage for PV charge | 34Vdc | 34Vdc |

Please follow below steps to implement PV module connection:

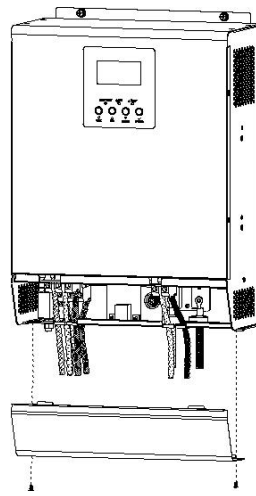
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



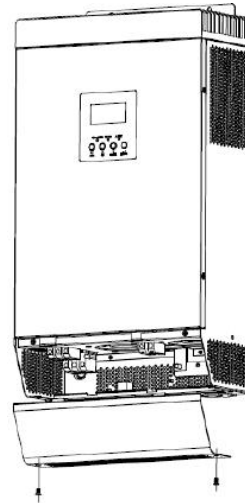
3. Make sure the wires are securely connected.

Final Assembly

After connecting all wirings, please put bottom cover back by screwing two screws as shown below.



3KVA



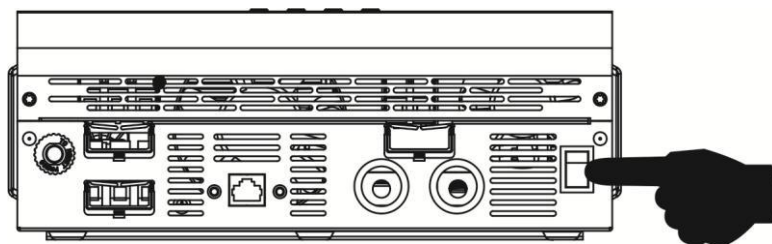
5KVA

Communication Connection

Please use supplied communication cable to connect to inverter and PC. Insert bundled CD into a computer and follow on-screen instruction to install the monitoring software. For the detailed software operation, please check user manual of software inside of CD.

OPERATION

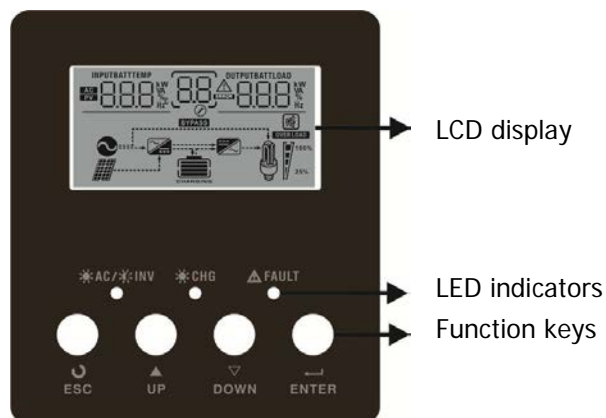
Power ON/OFF



Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the bottom of the case) to turn on the unit.

Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators, four function keys and a LCD display, indicating the operating status and input/output power information.



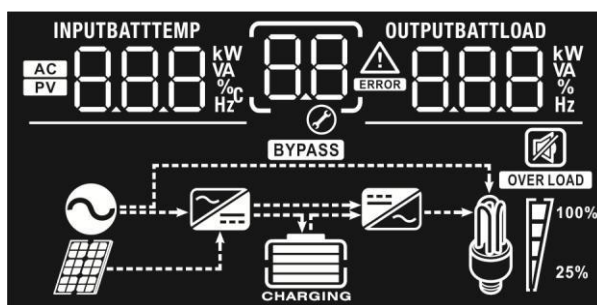
LED Indicator











| LED Indicator | | | Messages |
|---------------|-------|----------|---|
| | Green | Solid On | Output is powered by utility in Line mode. |
| | | Flashing | Output is powered by battery or PV in battery mode. |
| | Green | Solid On | Battery is fully charged. |
| | | Flashing | Battery is charging. |
| | Red | Solid On | Fault occurs in the inverter. |
| | | Flashing | Warning condition occurs in the inverter. |

Function Keys













| Function Key | Description |
|--------------|--|
| ESC | To exit setting mode |
| UP | To go to previous selection |
| DOWN | To go to next selection |
| ENTER | To confirm the selection in setting mode or enter setting mode |

LCD Display Icons








| Icon | Function description | |
|---|--|--|
| Input Source Information | | |
|  | Indicates the AC input. | |
|  | Indicates the PV input | |
|  | Indicate input voltage, input frequency, PV voltage, battery voltage and charger current. | |
| Configuration Program and Fault Information | | |
|  | Indicates the setting programs. | |
|  | Indicates the warning and fault codes. Warning:  flashing with warning code. | |
|  | Fault:  lighting with fault code | |
| Output Information | | |
|  | Indicate output voltage, output frequency, load percent, load in VA and load in Watt. | |
| Battery Information | | |
|  | Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode. | |
| In AC mode, it will present battery charging status. | | |
| Status | Battery voltage | LCD Display |
| Constant Current mode / Constant Voltage mode | <2V/cell | 4 bars will flash in turns. |
| | 2 ~ 2.083V/cell | Bottom bar will be on and the other three bars will flash in turns. |
| | 2.083 ~ 2.167V/cell | Bottom two bars will be on and the other two bars will flash in turns. |
| | > 2.167 V/cell | Bottom three bars will be on and the top bar will flash. |
| Floating mode. Batteries are fully charged. | | 4 bars will be on. |





In battery mode, it will present battery capacity.

| Load Percentage | Battery Voltage | LCD Display |
|------------------|--------------------------|---|
| Load > 50% | < 1.717V/cell |  |
| | 1.717V/cell ~ 1.8V/cell |  |
| | 1.8 ~ 1.883V/cell |  |
| | > 1.883 V/cell |  |
| 50% > Load > 20% | < 1.817V/cell |  |
| | 1.817V/cell ~ 1.9V/cell |  |
| | 1.9 ~ 1.983V/cell |  |
| | > 1.983 |  |
| Load < 20% | < 1.867V/cell |  |
| | 1.867V/cell ~ 1.95V/cell |  |
| | 1.95 ~ 2.033V/cell |  |
| | > 2.033 |  |


Load Information

| | | | | |
|---|---|---|---|---|
| OVER LOAD | Indicates overload. | | | |
|  | Indicates the load level by 0-24%, 25-50%, 50-74% and 75-100%. | | | |
| | 0%~25% | 25%~50% | 50%~75% | 75%~100% |
| |  |  |  |  |

Mode Operation Information

| | |
|---|---|
|  | Indicates unit connects to the mains. |
|  | Indicates unit connects to the PV panel. |
| BYPASS | Indicates load is supplied by utility power. |
|  | Indicates the utility charger circuit is working. |
|  | Indicates the DC/AC inverter circuit is working. |

Mute Operation

| | |
|---|-----------------------------------|
|  | Indicates unit alarm is disabled. |
|---|-----------------------------------|





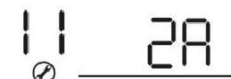














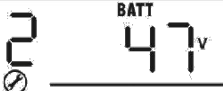

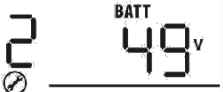
LCD Setting

After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.


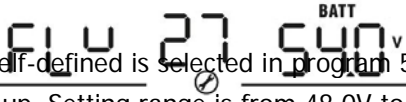

Setting Programs:

| Program | Description | Selectable option | |
|---------|---|---|--|
| 00 | Exit setting mode | Escape 00 ESC | |
| 01 | Output source priority: To configure load power source priority | Solar first 01 SOL | Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power the loads at the same time. Utility provides power to the loads only when any one condition happens: - Solar energy is not available - Battery voltage drops to low-level warning voltage |
| | | Utility first (default) 01 UTI | Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available. |
| | | SBU priority 01 SBU | Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12. |
| 02 | Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current) | Available options in 1KVA 24V and 1KVA/3KVA 48V models: | |
| | | 10A 02 10A | 20A (default) 02 20A |
| | | Available options in 2-3KVA 24V models: | |
| | | 20A 02 20A | 30A (default) 02 30A |
| | | Available options in 2-3KVA 24V/48V Plus and 4-5KVA 48V models: | |

| | | | |
|----|---|---|--|
| | | 10A (Not available for 2-3KVA 24V Plus) 02 10A | 20A 02 20A |
| | | 30A 02 30A | 40A 02 40A |
| | | 50A 02 50A | 60A (default) 02 60A |
| 03 | AC input voltage range | Appliances (default) 03 APL | If selected, acceptable AC input voltage range will be within 90-280VAC. |
| | | UPS 03 UPS | If selected, acceptable AC input voltage range will be within 170-280VAC. |
| 04 | Power saving mode enable/disable | Saving mode disable (default) 04 SDS | If disabled, no matter connected load is low or high, the on/off status of inverter output will not be effected. |
| | | Saving mode enable 04 SEN | If enabled, the output of inverter will be off when connected load is pretty low or not detected. |
| 05 | Battery type | AGM (default) 05 AGM | Flooded 05 FLD |
| | | User-Defined (only available in 4K/5K model) 05 USE | If "Us-Definerd" is sele charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29. |
| 06 | Auto restart when overload occurs | Restart disable (default) 06 Lfd | Restart enable 06 LFE |
| 07 | Auto restart when over temperature occurs | Restart disable (default) 07 Lfd | Restart enable 07 LFE |
| 09 | Output frequency | 50Hz (default) 09 50 Hz | 60Hz 09 60 Hz |
| 11 | Maximum utility charging current | Available options in 1KVA 24V model: | |
| | | 10A 11 10A | 20A(default): 11 20A |
| | | Available options in 2-3KVA 24V and 2-3KVA 24V Plus models: | |

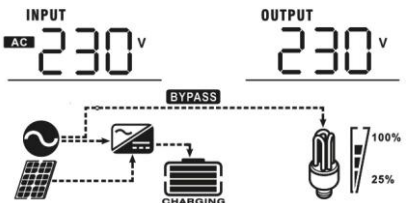
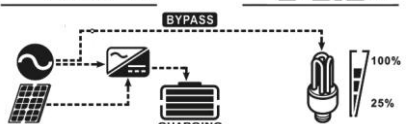
| | | | |
|--|--|---|---|
| | | 20A  | 30A (default)  |
| | | Available options in 1KVA/3KVA 48V and 2-3KVA 48V Plus models: | |
| | | 10A  | 15A(default):  |
| | | Available options in 4KVA/5KVA 48V models: | |
| | | 2A  | 10A  |
| | | 20A  | 30A (default)  |
| | Setting voltage point back to utility source when selecting "SBU priority" i program 01. | Available options in 24V models: | |
| | | 22.0V  | 22.5V  |
| | | 23.0V (default)  | 23.5V  |
| | | 24.0V  | 24.5V  |
| | | 25.0V  | 25.5V  |
| | | Available options in 48V models: | |
| | | 44V  | 45V  |
| | | 46V (default)  | 47V  |
| | | 48V  | 49V  |

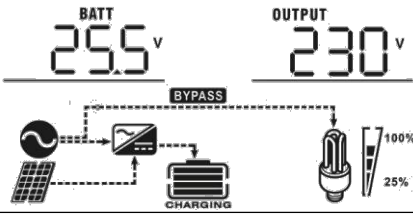
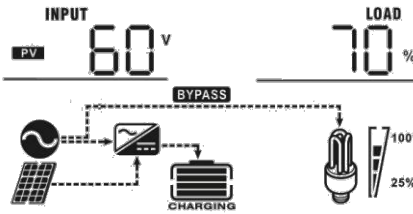
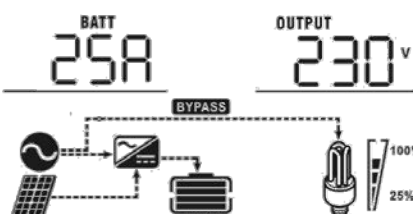
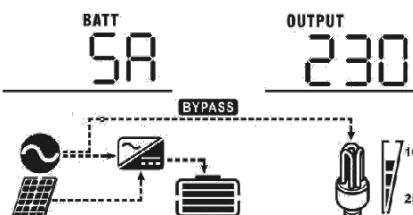
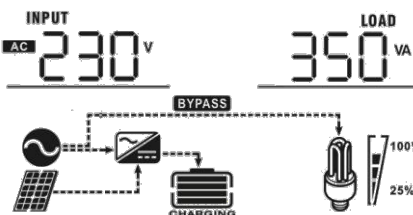
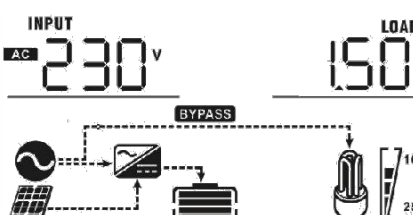
| | | | |
|----|---|--|---|
| | | 50V 12 ^{BATT} 50 _v | 51V 12 ^{BATT} 51 _v |
| 16 | Charger source priority: To configure charger source priority | If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below: | |
| | | Solar first 16 ^C 50 | Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available. |
| | | Utility first 16 ^C U _t | Utility will charge battery as first priority. Solar energy will charge battery only when utility power is not available. |
| | | Only Solar 16 ⁰ 50 | Solar energy will be the only charger source no matter utility is available or not. |
| | | If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient. | |
| 18 | Alarm control | Alarm on (default) 18 ^b 0 _n | Alarm off 18 ^b 0 _F |
| 19 | Auto return to default display screen | Return to default display screen (default) 19 ^E S _P | If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute. |
| | | Stay at latest screen 19 ^L E _P | If selected, the display screen will stay at latest screen user finally switches. |
| 20 | Backlight control | Backlight on (default) 20 ^L 0 _n | Backlight off 20 ^L 0 _F |
| 22 | Beeps while primary source is interrupted | Alarm on (default) 22 ^A 0 _n | Alarm off 22 ^A 0 _F |
| 23 | Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode. | Bypass disable (default) 23 ^b y _d | Bypass enable 23 ^b y _E |
| 25 | Record Fault code | Record enable 25 ^F E _n | Record disable (default) 25 ^F d _S |

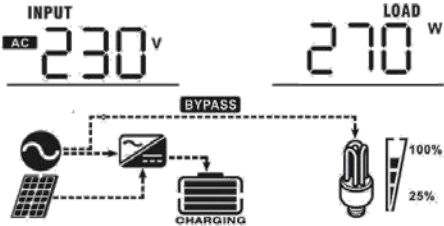
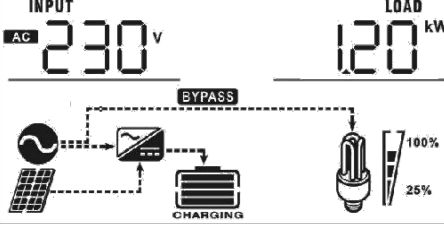
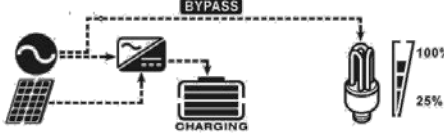
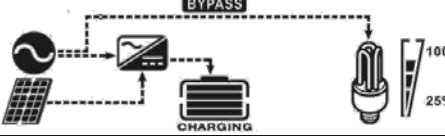
| | | |
|----|---|---|
| 26 | Bulk charging voltage (C.V voltage) (only available in 4K/5K model) |  <p>If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 58.4V and increment of each click is 0.1V.</p> |
| 27 | Floating charging voltage (only available in 4K/5K model) |  <p>If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 58.4V and increment of Each click is 0.1V.</p> |
| 29 | Low DC cut-off voltage (only available in 4K/5K model) |  <p>If self-defined is selected in program 5, this program can be set up. Setting range is from 40.0V to 48.0V and increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected. Then, low DC warning voltage is 2V higher than cut-off voltage, low DC warning return voltage is 4V higher than cut-off voltage and Cold Start Voltage is 4V higher than cut-off voltage.</p> |

Display Setting








Information is switched as below order: input voltage, input frequency, battery voltage, charging current, PV voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, main CPU Version and second CPU Version.

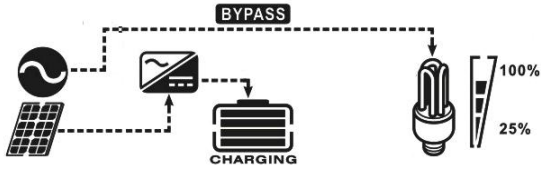
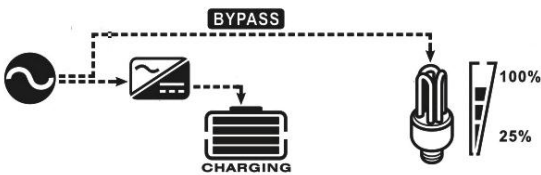
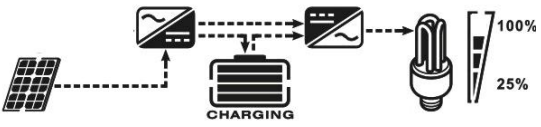
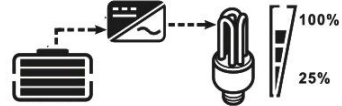
| Selectable information | LCD display |
|--|---|
| Input voltage/Output voltage (Default Display Screen) | <p>Input Voltage=230V, output voltage=230V</p>  |
| Input frequency/Output frequency | <p>Input frequency=50Hz, Output frequency=50Hz</p>  |

| | |
|---------------------------------|--|
| Battery voltage/Output voltage | <p>Battery voltage=25.5V</p>  |
| PV voltage/Load percentage | <p>PV voltage=60V, Load percent=70%</p>  |
| Charging current/Output voltage | <p>Current $\geq 10A$</p>  <p>Current $< 10A$</p>  |
| Input voltage/Load in VA | <p>When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.</p>  <p>When load is larger than 1kVA ($\geq 1kVA$), load in VA will present x.xkVA like below chart.</p>  |


















| | |
|---------------------------------------|--|
| <p>Input voltage/Load in Watt</p> | <p>When load is lower than 1kW, load in W will present xxxW like below chart.</p>  <p>When load is larger than 1kW ($\geq 1\text{KW}$), load in W will present x.xkW like below chart.</p>  |
| <p>Main CPU version checking</p> | <p>Main CPU version 00014.04</p>  |
| <p>Secondary CPU version checking</p> | <p>Secondary CPU version 00003.03</p>  |

Operating Mode Description

| Operation mode | Description | LCD display |
|--|--|--|
| Standby mode / Power saving mode Note: *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output. *Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected. | No output is supplied by the unit but it still can charge batteries. | Charging by utility.  |
| | | Charging by PV energy.  |
| | | No charging.  |
| Fault mode Note: *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on. | PV energy and utility can charge batteries. | Charging by utility. (Only available in 1K/2K/3K model)  |
| | | Charging by PV energy.  |
| | | No charging.  |
| | Utility can power loads when the unit starts up without battery. (Only available in 4K/5K model with single operation) | Power from utility  |









| | | |
|--------------|--|---|
| Line Mode | The unit will provide output power from the mains. It will also charge the battery at line mode. | <p>Charging by PV energy</p>  <p>Charging by utility.</p>  |
| Battery Mode | The unit will provide output power from battery and PV power. | <p>Power from battery and PV energy.</p>  <p>Power from battery only.</p>  |

Fault Reference Code

| Fault Code | Fault Event | Icon on |
|------------|---|---|
| 01 | Fan is locked when inverter is off. |  |
| 02 | Over temperature |  |
| 03 | Battery voltage is too high |  |
| 04 | Battery voltage is too low |  |
| 05 | Output short circuited or over temperature is detected by internal converter components. |  |
| 06 | Output voltage is abnormal. (For 1K/2K/3K model) Output voltage is too high. (For 4K/5K model) |  |
| 07 | Overload time out |  |
| 08 | Bus voltage is too high |  |
| 09 | Bus soft start failed |  |
| 11 | Main relay failed |  |
| 51 | Over current or surge |  |
| 52 | Bus voltage is too low |  |
| 53 | Inverter soft start failed |  |
| 55 | Over DC voltage in AC output |  |
| 56 | Battery connection is open |  |
| 57 | Current sensor failed |  |
| 58 | Output voltage is too low |  |

NOTE: Fault codes 51, 52, 53, 55, 56, 57 and 58 are only available in 4K/5K model.

Warning Indicator

| Warning Code | Warning Event | Audible Alarm | Icon flashing |
|--------------|---|-------------------------------|---|
| 01 | Fan is locked when inverter is on. | Beep three times every second |  |
| 03 | Battery is over-charged | Beep once every second |  |
| 04 | Low battery | Beep once every second |  |
| 07 | Overload | Beep once every 0.5 second |  |
| 10 | Output power derating | Beep twice every 3 seconds |  |
| 12 | Solar charger stops due to low battery. | |  |
| 13 | Solar charger stops due to high PV voltage. | |  |
| 14 | Solar charger stops due to overload. | |  |

SPECIFICATIONS

Table 1 Line Mode Specifications

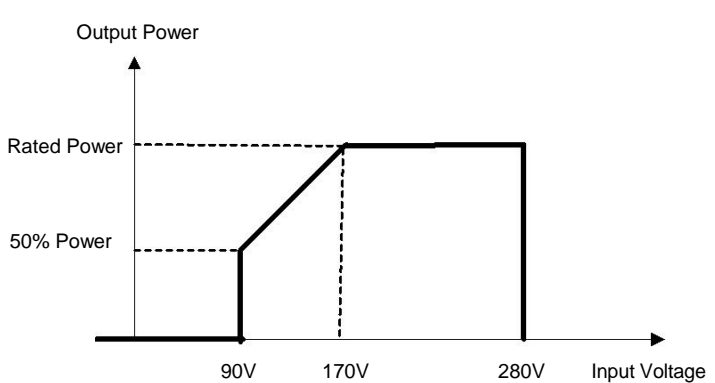
| | | | |
|--|--|----------|----------|
| SOLAR INVERTER MODEL | | SPG2400W | SPG4000W |
| Input Voltage Waveform | Sinusoidal (utility or generator) | | |
| Nominal Input Voltage | 230Vac | | |
| Low Loss Voltage | 170Vac \pm 7V (UPS) 90Vac \pm 7V (Appliances) | | |
| Low Loss Return Voltage | 180Vac \pm 7V (UPS); 100Vac \pm 7V (Appliances) | | |
| High Loss Voltage | 280Vac \pm 7V | | |
| High Loss Return Voltage | 270Vac \pm 7V | | |
| Max AC Input Voltage | 300Vac | | |
| Nominal Input Frequency | 50Hz / 60Hz (Auto detection) | | |
| Low Loss Frequency | 40 \pm 1Hz | | |
| Low Loss Return Frequency | 42 \pm 1Hz | | |
| High Loss Frequency | 65 \pm 1Hz | | |
| High Loss Return Frequency | 63 \pm 1Hz | | |
| Output Short Circuit Protection | Line mode: Circuit Breaker Battery mode: Electronic Circuits | | |
| Efficiency (Line Mode) | >95% (Rated R load, battery full charged) | | |
| Transfer Time | 10ms typical (UPS); 20ms typical (Appliances) | | |
| Output power derating: When AC input voltage drops to 170V, the output power will be derated. |  | | |

Table 2 Inverter Mode Specifications

| | | | |
|--|----------------------------------|-------------------------------|----------|
| SOLAR INVERTER MODEL | | SPG2400W | SPG4000W |
| Rated Output Power | | 3KVA/2.4KW | 5KVA/4KW |
| Output Voltage Waveform | Pure Sine Wave | | |
| Output Voltage Regulation | 230Vac± 5% | | |
| Output Frequency | 50Hz | | |
| Peak Efficiency | 90% | | |
| Overload Protection | 5s@≥150%; 10s@110%~150%load load | | |
| Surge Capacity | 2* rated power for 5 seconds | | |
| Nominal DC Input Voltage | | 48Vdc | |
| Cold Start Voltage | | 46.0Vdc | |
| Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50% | | 44.0Vdc 42.8Vdc 40.4Vdc | |
| Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50% | | 46.0Vdc 44.8Vdc 42.4Vdc | |
| Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50% | | 42.0Vdc 40.8Vdc 38.4Vdc | |
| High DC Recovery Voltage | | 58Vdc | |
| High DC Cut-off Voltage | | 62Vdc | |
| No Load Power Consumption | | | <50W |
| Saving Mode Power Consumption | | | <15W |

Table 3 Charge Mode Specifications

| Utility Charging Mode | | | | |
|---|-------------------|---|----------|----------|
| INVERTER MODEL | | | SPG2400W | SPG4000W |
| Charging Current (UPS) @V _{I/P} =230Vac | | | 10/15A | 20/30A |
| Bulk Charging Voltage | Flooded Battery | | 58.4 | |
| | AGM / Gel Battery | | 56.4 | |
| Floating Charging Voltage | | | 54Vdc | |
| Charging Algorithm | | 3-Step | | |
| Charging Curve | | <div><div><div>Battery Voltage, per cell</div><div><div><div>2.43Vdc (2.35Vdc)</div><div>2.25Vdc</div></div><div><div><div>T0</div><div>T1</div></div><div>T1 = 10* T0, minimum 10mins, maximum 8hrs</div></div></div><div><div>Bulk (Constant Current)</div><div>Absorption (Constant Voltage)</div><div>Maintenance (Floating)</div></div></div><div><div>Charging Current, %</div><div><div>100%</div><div>50%</div></div><div><div>Voltage</div><div>Current</div></div><div>Time</div></div></div> | | |

| Solar Charging Mode | | | | |
|------------------------------------|------------|------------|-----------|-----------|
| INVERTER MODEL | | SPG2400W | | SPG 4000W |
| | | 900W | | 3000W |
| Rated Power | | 900W | | 3000W |
| Efficiency | 98.0% max. | | | |
| Max. PV Array Open Circuit Voltage | | 102Vdc max | 145Vdc | |
| PV Array MPPT Voltage Range | | 60~88Vdc | 60~115Vdc | |
| Min battery voltage for PV charge | | 34Vdc | 34Vdc | |
| Standby Power Consumption | 2W | | | |
| Battery Voltage Accuracy | +/-0.3% | | | |
| PV Voltage Accuracy | +/-2V | | | |
| Charging Algorithm | 3-Step | | | |

Table 4 General Specifications

| | | | | | | |
|------------------------------------|-----------------|--|----------|--|---------------|----------|
| INVERTER MODEL | | | SPG2400W | | | SPG4000W |
| Safety Certification | CE | | | | | |
| Operating Temperature Range | 0°C to 55°C | | | | | |
| Storage temperature | -15°C~ 60°C | | | | | |
| Dimension (D*W*H), mm | 128 x 272 x 355 | | | | 140 x295 x540 | |
| Net Weight, kg | | | 8.0 | | | 13.5 |

TROUBLE SHOOTING

| Problem | LCD/LED/Buzzer | Explanation / Possible cause | What to do |
|---|---|---|--|
| Unit shuts down automatically during startup process. | LCD/LEDs and buzzer will be active for 3 seconds and then complete off. | The battery voltage is too low (<1.91V/Cell) | 1. Re-charge battery. 2. Replace battery. |
| No response after power on. | No indication. | 1. The battery voltage is far too low. (<1.4V/Cell) 2. Battery polarity is connected reversed. | 1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery. |
| Mains exist but the unit works in battery mode. | Input voltage is displayed as 0 on the LCD and green LED is flashing. | Input protector is tripped | Check if AC breaker is tripped and AC wiring is connected well. |
| | Green LED is flashing. | Insufficient quality of AC power. (Shore or Generator) | 1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS → Appliance) |
| | Green LED is flashing. | Set "Solar First" as the priority of output source. | Change output source priority to Utility first. |
| When the unit is turned on, internal relay is switched on and off repeatedly. | LCD display and LEDs are flashing | Battery is disconnected. | Check if battery wires are connected well. |
| Buzzer beeps continuously and red LED is on. | Fault code 07 | Overload error. The inverter is overload 110% and time is up. | Reduce the connected load by switching off some equipment. |
| | Fault code 05 | Output short circuited. | Check if wiring is connected well and remove abnormal load. |
| | | Temperature of internal converter component is over 120°C. | Check whether the air flow of the unit is blocked or whether the ambient temperature is too high. |
| | Fault code 02 | Internal temperature of inverter component is over 100°C. | |
| | Fault code 03 | Battery is over-charged. | Return to repair center. |
| | | The battery voltage is too high. | Check if spec and quantity of batteries are meet requirements. |
| | Fault code 01 | Fan fault | Replace the fan. |
| | Fault code 06/58 | Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac) | 1. Reduce the connected load. 2. Return to repair center |
| | Fault code 08/09/53/57 | Internal components failed. | Return to repair center. |
| | Fault code 51 | Over current or surge. | Restart the unit, if the error happens again, please return to repair center. |
| | Fault code 52 | Bus voltage is too low. | |
| | Fault code 55 | Output voltage is unbalanced. | |
| | Fault code 56 | Battery is not connected well or fuse is burnt. | If the battery is connected well, please return to repair center. |